

# **EBR Review Response: Waterloo Moraine**

**April 2009**

**Ministry of the Environment**

*Protecting our environment.*



**Ontario**

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## **1. Introduction**

### **1.1. *Summary of the Applications***

The purpose of this review was to assess the current protection framework, and to determine whether there is a need for new provincial policy to protect groundwater and source waters in the Waterloo moraine. The Ministry of the Environment (MOE) agreed to undertake this review in response to applications made on July 17 and July 27, 2006 under section 61 of the *Environmental Bill of Rights, 1993* (EBR). One application identified the need for a policy to protect the Waterloo moraine in a similar framework to the *Oak Ridges Moraine Conservation Act, 2001*. The other identified development as a specific concern and indicated that groundwater volumes needed greater protection beyond that provided by the *Ontario Water Resources Act*, the *Safe Drinking Water Act*, and the Provincial Policy Statement (PPS). Specifically, the applicants submitted the review should be undertaken because:

- groundwater resources should be protected;
- recharge areas should be protected from contamination (salt, nitrates, pesticides);
- recharge is required for natural functions, including fish habitat;
- the moraine provides drinking water;
- recharge areas should be maintained in their natural state;
- development pressure threatens recharge areas; and
- water shortages and reduced water volumes in aquifers should be prevented.

Response letters were sent by the MOE to the applicants on April 24, 2007. The letters indicated that the MOE would review existing policies and the need for new policies related to some of the issues raised in the EBR applications. The letter also outlined the scope of the review.

### **1.2. *Objectives of the Review***

The objectives of this review were to:

- 1) review existing policies related to protection of groundwater recharge; and
- 2) assess potential policy gaps and determine if there is a need for new provincial policy to protect the Waterloo moraine, in particular to protect

groundwater and source waters from the potential impacts of development, including contamination, reductions in recharge, and the loss of existing groundwater volumes.

### **1.3. Approach to the Review and Scope**

There were two primary aspects to the review: (1) a review of existing policies and an analysis of potential gaps related to protecting the moraine functions, and (2) a review of current technical information and knowledge concerning the hydrogeology of the Waterloo moraine and identification of gaps in understanding. Technical understanding of the moraine is important in order to identify the key features and functions of the moraine that warrant protection, to assist in policy analysis, and to determine if there are significant information gaps.

To carry out the review, the MOE established a review team and an inter-ministry committee, comprising of the Ministries of Municipal Affairs and Housing (MMAH), Natural Resources (MNR), Agriculture, Food and Rural Affairs (MAFRA), Northern Development and Mines (MNDM), Energy and Infrastructure (MEI), and Transportation (MTO).

Consistent with the applicant's request, the MOE set the scope of the review to include an examination of moraine and groundwater protection policies applicable to the geographic area of the Waterloo moraine. Although a wide range of policies were reviewed, the scope did not include recommending changes to policies that were not within the MOE's mandate (e.g. the PPS, the Greenbelt Plan, the Growth Plan for the Greater Golden Horseshoe). The scope of the review also did not include revisiting decisions related to pieces of provincial legislation where decisions had been made within the last five years consistent with the Environmental Bill of Rights (e.g. *Ontario Water Resources Act* including the Permit to Take Water program, *Clean Water Act, 2006*, *Nutrient Management Act, 2002*, *Environmental Assessment Act*). An examination of the implementation of provincial policies informed the review.

The MOE gathered policies and related information through contacts with other ministries, municipalities, and the Grand River Conservation Authority (GRCA) to discuss the issues and to supplement information provided by the applicants. Discussions focussed on the Waterloo moraine and its protection, including issues related to water quantity and quality.

The MOE review team examined both provincial and municipal policies, and had discussions with municipal, conservation authority and provincial staff in the analysis of provincial and municipal policies and practices.

In the provincial policy analysis, the review included examination of the protection of the functions of the moraine (groundwater recharge, discharge, storage). Policies were examined for: definitions; protection of hydrologic function for drinking water purposes and for ecological purposes; requirements for mapping of recharge, discharge and storage functions; presence of technical guidance for identification and/or delineation of functions; and roles and responsibilities. The review did not include a detailed evaluation of municipal implementation of provincial policy direction.

In addition, a jurisdictional scan was completed and a summary is attached in Appendix 1.

## **2. Moraines**

The term 'moraine' and the need to protect 'moraines' have gained prominence in Ontario since the Oak Ridges Moraine Conservation Plan was implemented in 2001.

Glaciers carry and deposit a variety of geologic debris that is eroded from the landscape that glaciers move over. Some of these glacial deposits are called moraines. The various glacial advances and retreats in Southern Ontario from different ice lobes have resulted in a series of moraine deposits throughout the region. The structure and composition of moraines are a function of their depositional environment and the underlying geological material that the glacier moves over. Moraines can therefore vary considerably in size, shape and geologic composition, as well as aerial extent, height and thickness.

End moraines (or terminal moraines) are ridges of glacial sediment that accumulate along and at the margins of glaciers. More specifically, kame moraines are end moraines that contain numerous hummocky mounds of irregularly bedded sand and gravel with subordinated till, deposited in patches from meltwater flowing in contact with a moving or decaying glacier.

Interlobate moraines are formed as a result of large ice sheets advancing irregularly so that their margins are 'lobate', the retreating margins of ice deposit thermal moraines of boulders, clay and sand leaving the original interlobate shape of the glaciers, hence the term 'interlobate moraine'. Both the Waterloo moraine and the Oak Ridges Moraine are characterised as interlobate moraines.

Hummocky moraines are areas of knob and kettle topography that may have been formed either along an active ice sheet or around a mass of stagnant ice. Knob and kettle topography is an undulating landscape in which a disordered assemblage of knolls, mounds, or ridges of glacial debris is interspersed with irregular depressions and pits (kettle) that are commonly undrained and may contain swamps or ponds.

Moraines are often cited for their significance in providing many functions to the environment. Each moraine will provide its own specific functions depending on its size, structure and location. There are a number of functions that are often associated with larger moraines in Southern Ontario and other parts of the Great Lakes Basin. As a result of these functions, moraines may provide groundwater recharge, discharge and storage functions, which result in water quality and quantity related benefits, such as:

- Maintenance/improved quantity and quality of drinking water and water for other users;
- Provision and protection of habitat;
- Filtration of water (runoff/rainfall);
- Maintenance of stream flows and wetlands and resiliency during seasonal and longer terms droughts;
- Decrease of storm flows and downstream flooding; and
- Adaptation to impacts of climate change.

## **2.1. Context**

Waterloo and Kitchener are identified as urban grown centres in the Growth Plan for the Greater Golden Horseshoe. Urban growth centres will be planned to achieve, by 2031, residents and jobs gross density targets.

The Region of Waterloo Water Supply Master Plan indicates there is sufficient groundwater water supply, assuming water conservation and efficiency programs, to support the growth targets to 2031 (as indicated in the Growth Plan for the Greater Golden Horseshoe). A lake pipe line would be required after 2031. Details studies under *The Clean Water Act, 2006* for Kitchener, Waterloo and Cambridge well fields are underway and results are expected in 2010.

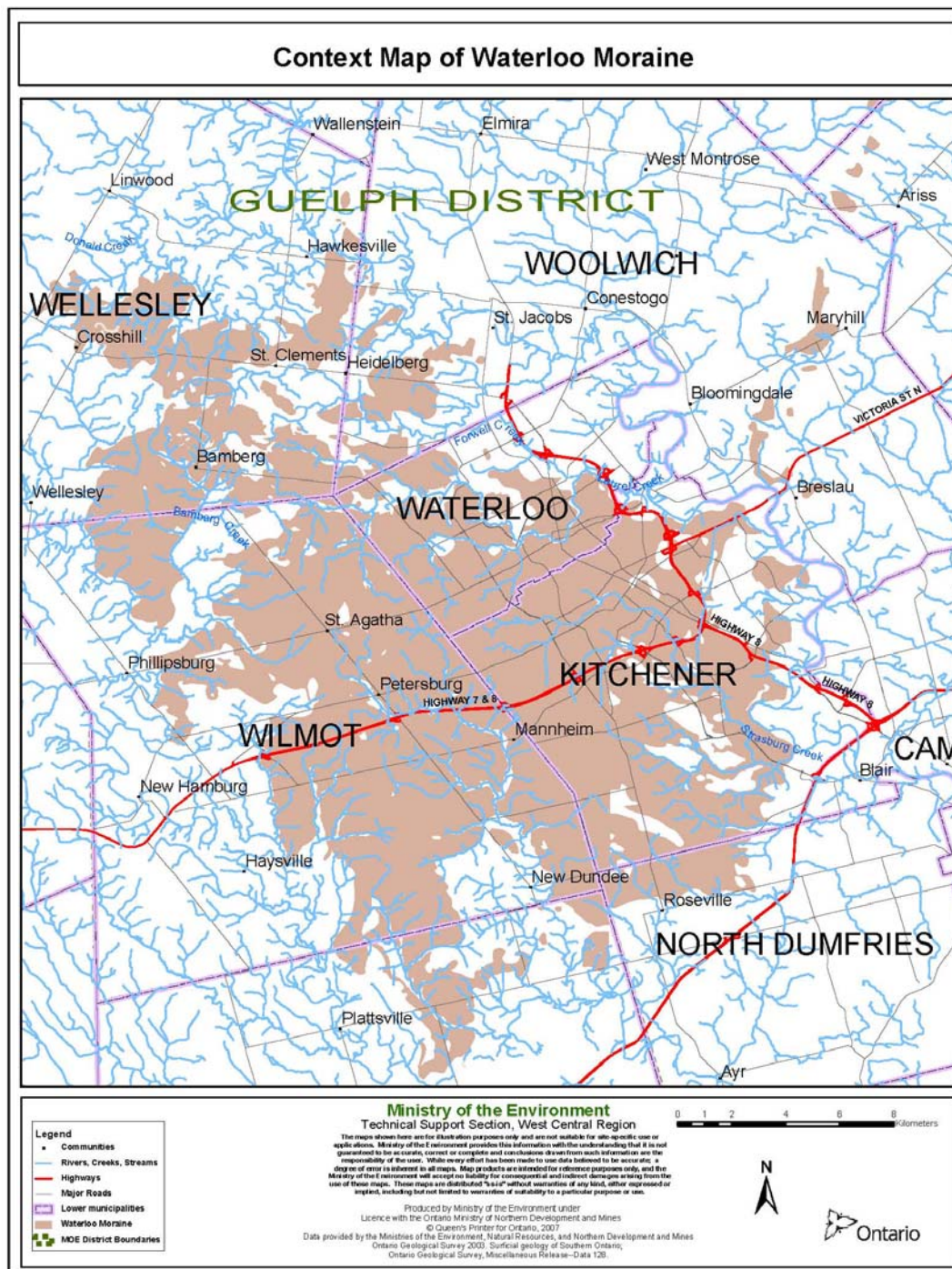
## **2.2. Waterloo Moraine – Description and Function**

The Waterloo moraine is an interlobate moraine with an extensive sand core and multiple till layers. Located in the middle of the Grand River Watershed (refer to Figure 1) and approximately 400 km<sup>2</sup> in size, this complex moraine presents as

gently rolling to undulating hills and rises about 430m in the north portion to 325 m in the southeast. The multi-aquifer provides water to most of the residents of Kitchener/Waterloo and rural areas to the west of Kitchener/Waterloo. The central portion is generally covered with a thick till cap on which the cities of Waterloo and Kitchener have developed. Much of the major recharge area is located to the west of the urban area in a rural agricultural area.



**Figure 1: Map of Waterloo Moraine**



*This map is not the official boundary map of the moraine and was used for discussion purposes in this review. For detailed discussion on the boundary of the moraine, please refer to Appendix 2.*

### **2.3. Summary of the State of Knowledge of the Waterloo Moraine**

To initiate the review, the current state of knowledge and existing data on the Waterloo moraine were examined. For the purposes of this review, data is defined as the parameters input into models for decision making. Knowledge is defined as a broader understanding of recharge and discharge quantities, groundwater flow/velocity and contaminant transport. Key points of the study are summarized below. Please refer to Appendix 2 for the detailed study.

The Waterloo moraine has provided much of the water supply for the cities of Kitchener and Waterloo for over 100 years and has been the subject of intensive research for about 35 years. This has resulted in the Region having the most comprehensive set of subsurface information anywhere in the province. Research on the moraine comprises of on-going collaboration among the Region of Waterloo, University of Waterloo, the Ontario Geological Survey (OGS), the Geological Survey of Canada and the Grand River Conservation Authority. Requirements for watershed and subwatershed studies have provided additional information, and water quantity assessments (Tier 2 and Tier 3 water budgets) under the *Clean Water Act* are currently ongoing.

#### Moraine Boundary

The boundaries of the Waterloo moraine as understood today are generally consistent with the way they were delineated historically. There are some variations in the boundaries, and the OGS has identified a possibility for re-interpretation of the extent of the moraine boundary. However, hydrologic features in the Waterloo moraine area can be further defined independent of the moraine boundary.

#### Geology and Hydrogeology

There is a good understanding of the geology of the Waterloo moraine. For detailed information on the geology and hydrogeology of the moraine please refer to Appendix 2.

#### Recharge and Storage

The location of the main recharge area within the Waterloo moraine, which provides water to most of the well fields within the Waterloo moraine, is reasonably understood. Additional recharge areas, providing water to water-related ecological features and baseflow have not been specifically defined or mapped. However, ecologically sensitive areas, as defined in the Region of Waterloo draft Official Plan (2008), may consider recharge areas that support water-related ecological features.

#### Water Supply

Extensive water quantity and quality monitoring have been undertaken by the Region of Waterloo. Water supplies have been assessed by the Region, and further study will include a Tier 3 water budget (under the *Clean Water Act*) to provide an in-depth quantity analysis for municipal residential water supplies. The Tier 3 water budget studies are carried out for specific well fields where potential water quantity stresses are suspected. These studies are expected to be completed by 2010. New short term future water supplies are also currently being assessed.

#### Maintenance of Water-related Ecological Features and Discharge

The Waterloo moraine contains extensive wetlands and other ecological features. There is sufficient information to show where these features exist, though site-specific studies may be required to link groundwater and site specific features at the local level. The timing of subwatershed studies relative to the development of conceptual land use designations and/or constraints in the context of the planning development and approval process is important.

#### Water Quality

Water quality studies have been carried out for decades and indicate an increase in sodium and chloride concentrations since the 1960's as a result of road salting. Nitrate concentrations are elevated in several rural areas as a result of decades of agricultural fertilizer use. Pilot studies are being undertaken by the Region that include strategies aimed at reducing the levels of nitrate and chloride. There are data gaps, as would be expected in any water quality assessment at this scale. The data continues to be collected and refined.

The Region has implemented a number of new initiatives such as the Rural Water Quality Program, land management and financial incentives in the area of a rural water supply well with elevated nitrates, a salt reduction program throughout the Region, and prioritization of high risk threats within well head protection areas to reduce risks to water quality.

### **3. How the Moraine is Protected**

#### ***3.1. Provincial Legislation and Policy***

The existing provincial policy framework provides for the protection of water resources, including groundwater recharge, discharge and storage functions. A summary of these policies follows.

### **3.1.1. *Ontario Water Resources Act, 1990***

The purpose of the *Ontario Water Resources Act* (OWRA) is to provide for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social and economic well-being. There are many tools under the Act which aim to achieve its purpose. For example, water takings over 50,000 litres per day are managed through the Permit to Take Water Program. The construction of wells, including the licensing of well contractors and technicians, is regulated under Ontario Regulation 903 of the *Ontario Water Resources Act*. Certificates of Approval are issued under the Act to persons who are establishing, altering, extending or replacing a new or existing sewage works. In addition to effluent criteria, the approvals contain requirements for the design and build of the works as well as terms and conditions for their operation, maintenance and monitoring. The approvals can also impose other terms and conditions that the owner must meet. Although the Act contains requirements for the protection of water quality and quantity, the OWRA does not specifically refer to the protection of moraine functions (recharge, discharge, storage) as set out in this review.

### **3.1.2. *Environmental Protection Act, 1990***

The general purpose of the *Environmental Protection Act* is to provide for the protection and conservation of the natural environment. More specifically, the EPA protects Ontario's water resources from pollution. Under the Act, Directors can issue orders against persons responsible for the discharge of contaminants to the natural environment (including water) beyond levels prescribed in regulations. The authorities provided for under the Act are broad and therefore the Act does not specifically refer to the protection of moraine functions (recharge, discharge, storage) as set out in this review.

### **3.1.3. *Clean Water Act, 2006***

The *Clean Water Act* (CWA), 2006 came into effect on July 3, 2007. The purpose of the Act is to protect existing and future sources of drinking water. On November 4, 2008, a General Regulation (O. Reg. 287/07) was made under the CWA amalgamating several regulations and requirements of the Act. Under the Act, communities are required to assess drinking water sources for municipal residential drinking water systems and any other systems included in the planning process, identify sources of contamination or water shortages (called drinking water threats), and create and implement a source protection plan to protect both the quality and quantity of these drinking water sources. To date, assessments completed under the CWA (e.g. water quantity Tier 2 assessment) have identified the cities of Waterloo, Kitchener and Cambridge as having moderate to significant stress for future water supplies. As such, these areas are subject to more detailed Tier 3 studies, which are currently underway. Results

are expected in 2010.

The legislation requires the identification of wellhead protection areas, highly vulnerable aquifers, significant groundwater recharge areas, and surface water intake protection zones for municipal residential systems and other systems. Technical rules made under the Act have established the methods to delineate these protection areas. More specifically, through the preparation of assessment reports, there is a requirement that significant groundwater recharge areas be delineated and mapped. These areas must have a hydrological connection to a surface water body or aquifer that is a source of drinking water for a drinking water system. Therefore, significant groundwater recharge areas connected to a municipal residential drinking water source on the Waterloo moraine will be delineated and mapped to meet the requirements of the CWA.

Roles and responsibilities of municipalities and conservation authorities for implementation are clearly defined through the work of the source protection committees as established by the Act and the regulation. Source protection committees are to determine appropriate policies for the protection against threats in wellhead protection areas, highly vulnerable aquifers, significant groundwater recharge areas and surface water intake protection zones within their source protection areas/regions. Municipalities have a strong role in developing and implementing source protection plans in all areas under municipal jurisdiction. With one-third representation on the source protection committees, municipalities across a given source protection area/region will work with other members of the committee to identify, assess and address threats to drinking water within their municipal wellhead and intake protection areas. The Act does not give conservation authorities new regulatory or enforcement powers. However, conservation authorities will provide source protection committees with local facilitation, coordination and technical support during the assessment and planning process.

#### **3.1.4. *Environmental Assessment Act, 1990***

The *Environmental Assessment Act* (EAA) provides for the protection, conservation and management of the environment in Ontario by establishing a responsible and accountable process of decision making. The EAA provides a legislative basis for the preparation, submission and review of various types of environmental assessment (EA) documents.

The EAA requires that individual EAs and Class EA parent documents be prepared in accordance with a Terms of Reference which has been approved by the MOE. Once approved, the Terms of Reference provides a framework for preparing the EA or Class EA. Proponents are encouraged, through pre-submission consultation and through the development and review of the Terms of Reference, to incorporate ecosystem principles in their decision making for all

types of EAs.

The EA Act requires the Terms of Reference to define the study area and outline a brief description of the environment that may be affected or reasonably expected to be affected, directly or indirectly, by the alternatives and the undertaking. The proponent is to conduct studies/research to provide a final description of the environment within the study area, building upon the description given in the approved Terms of Reference. Generally, each environment is broken down into its component parts, though some overlap between the different environments is possible. For example, in a description of the natural environment, at minimum, geology, hydrogeology and biology will be described. The EA Act requires proponents to outline how the project will attempt to prevent, avoid or minimize adverse environmental effects through the application of impact management measures.

A proponent may apply to the Minister for approval of a Class Environmental Assessment (Class EA) with respect to a class of undertakings, known as a Class EA document. The approved Class EA document establishes a streamlined planning process for proponents to follow in order to fulfill the requirements of the EA Act approval of a project within the class of undertakings. The Class EA approach allows for evaluation of the environmental effects of alternatives to an undertaking and alternative methods of carrying out a project, and expedites the environmental assessment of smaller recurring projects (e.g., road widening/upgrading). There are currently 10 approved Class EAs in Ontario covering a range of projects and activities including: municipal infrastructure, transit, provincial highways, forest management, activities in provincial parks, disposition of Crown resources, nuisance species control, fish stocking, shoreline and stream bank stabilization, access roads, hydro transmission lines, modifications to hydroelectric facilities, as well as flood and erosion control projects. Class EA Parent documents are prepared, including a Terms of Reference, and are formally submitted to the Minister for review and approval following the same basic process as used for Individual EAs. Once the Parent document is approved, some project types included in the particular class of undertakings (Schedule A and A+) have pre-approval under the EAA.

Schedule B projects are subject to the Class EA Environmental Screening Process. This process outlines screening criteria that must be used to evaluate certain projects. Surface and groundwater screening criteria include: (1) negative effects on surface quality, quantities or flow; (2) negative effects on ground water quality, quantity or movement; (3) significant sedimentation, soil erosion or shoreline or riverbank erosion on or off site; and (4) potential negative effects on surface or groundwater from accidental spills or releases to the environment.

The technical review of an EA typically considers policies such as the EA Act, the OWRA, the *Pesticides Act* and any associated regulations, policies, area specific

Acts, Plans, guidelines, and provincial policies (i.e. Oak Ridges Moraine Conservation Plan, Niagara Escarpment Plan, etc.). If appropriate, groundwater is considered in the technical review with respect to the protection of quantity (i.e. whether users and/or baseflows will be impacted by withdrawals or physical changes to the aquifer) and whether or not controlled or uncontrolled discharges from the undertaking will have negative impacts on area groundwater quality and adversely affect human health (drinking water, household, recreational use, the ecosystem including aquatic life), and water users (industry, agriculture, etc.). Consideration of surface water and the protection of surface water quality against physical, chemical, temperature and geomorphological changes are also considered when appropriate.

#### **3.1.5. Nutrient Management Act, 2002**

The Nutrient Management Act provides a comprehensive nutrient management framework for Ontario's agricultural industry, municipalities and other generators of materials containing nutrients that are land applied. The objective of nutrient management is to ensure that nutrients (mainly nitrogen, phosphorus and potassium from manure, chemical fertilizers and septic systems) are wisely used for optimum economic benefit, while minimizing impact on the environment. The legislation gives best management practices the force of law. Best management practices include location requirements for nutrient storage and application (e.g. setbacks from water courses), application rates, requirements for Nutrient Management Plans and Strategies, and mandatory training and certification.

#### **3.1.6. Aggregate Resources Act, 1990**

While the applicants did not specifically request an examination of aggregate extraction, it is useful to understand that the *Aggregate Resources Act* (ARA) provides a regulatory regime to address water resource management concerns.

One purpose of the *Aggregate Resources Act* is to minimize adverse impacts on the environment in respect of aggregate operations. The ARA enables the Minister of Natural Resources to initiate studies on environmental and social matters related to the licensing and operation of pits and quarries. The ARA requires operators on private land to acquire a licence to extract aggregate. Prior to the licence being issued or refused, the Minister shall have regard to the effect of the operation of the pit or quarry on the environment and any possible effects on ground and surface water resources. The ARA prohibits wayside pits in areas zoned as having particular environmental sensitivity.

Under the ARA, the Ministry of Natural Resources has established provincial standards which include:



- For new and amended licences/permits proposing to extract near or within the water table, a requirement for a hydrogeological report. Where operations propose to remain 1.5 metres above the water table in the case of a pit or 2 metres in the case of a quarry, a hydrogeological report is not required unless specifically requested by MNR (rare circumstances). The only requirement is a determination of the water table by a qualified person. A qualified person must be a registered professional geoscientist or licensed professional engineer with appropriate training related to hydrogeology.
- If the results of the Level 1 report identify the potential for an adverse effect from the operation, a requirement for a more comprehensive impact assessment (i.e. Hydrogeological Level 2 Report). All Level 2 reports must be circulated to MOE for comment. The Level 2 report assesses the significance of the effect and the feasibility of mitigation.
- A Hydrogeological Level 2 report (an impact assessment) that must:
  1. identify impacts on:
    - water wells,
    - springs,
    - groundwater aquifers,
    - surface watercourses and bodies,
    - discharge to surface water,
    - proposed water diversion, storage and drainage facilities on site, and
    - water budget; and
  2. provide:
    - a description of the physical setting including local geology, hydrogeology and surface water systems,
    - a description of mitigation measures including trigger mechanisms,
    - a description of the methodology
    - a contingency plan,
    - a monitoring plan,
    - an impact assessment, and
    - technical support data in the form of tables and figures.

For permits or licences proposing to extract aggregate material from within or near the water table, a hydrogeological report must be prepared by a qualified person (professional geoscientist or licensed as a professional engineer with appropriate training related to hydrogeology).

- In reviewing licences and permit applications and site plan amendments to extract below the water table, both MNR and MOE hydrogeologists examine that sufficient field work has been conducted, reasonable geological models were used, an appropriate numeric model (if



applicable) was used, and that a comprehensive well survey was conducted. Potential impacts if any on water well supplies and nearby surface water features are also reviewed to ensure that adverse impact to supplies and the quality and flow of receiving water bodies are mitigated. The Provincial Standards requires potential effects to be assessed within the zone of influence for extraction below the water table. Although the term “cumulative impact” is not specifically referred to, the effects of multiple aggregate operations are still considered at the local scale. Consideration at the watershed or sub-watershed scale is generally not considered.

Since 2005, the MNR has participated in a process with the Grand River Conservation Authority (GRCA) and the Ontario Stone, Sand and Gravel Association to develop Best Management Guidelines to Assess Cumulative Impacts of Below Water Aggregate Operations within the Grand River Watershed. This draft guideline outlines a process for local scale and subwatershed scale cumulative effects assessments within the Grand River Basin. While the guideline is not mandatory under the *Aggregate Resource Act*, the parties have agreed to follow these guidelines and monitor its implementation. The Ministry of the Environment has provided input and will participate in the implementation. It is anticipated the draft document will be circulated to municipalities for review later in 2009.

#### **3.1.7. The Planning Act, 2006 and the Provincial Policy Statement, 2005**

The *Planning Act* is the legislative framework which sets out ground rules for land use planning in the province. The *Planning Act* outlines decision-making responsibilities for municipalities, the Ministry of Municipal Affairs and Housing and other decision-makers in the land use planning system and provides a legislative basis for municipalities to prepare official plans and zoning by-laws to guide future land use. The Act provides a review framework for development applications involving changes in land use and the subdividing of land.

The *Planning Act* allows the Minister of Municipal Affairs and Housing to issue policy statements on matters related to land use planning that are of provincial interest. The PPS, 2005 provides clear policy direction on matters relating to land use planning and development of provincial interest. The policies of the PPS, 2005 recognize the importance of a clean and healthy environment, while providing appropriate direction for municipalities to meet the range of land use needs of their communities. Municipal official plans are the most important vehicle for implementation of the PPS. All decisions that affect a planning matter must be consistent with the PPS. The *Planning Act* also requires a review of the PPS every 5 years.

The policies of the PPS, 2005 are designed to help maintain and restore the

diversity and connectivity of natural features in an area and the ecological function and biodiversity of natural heritage systems recognizing linkages between and among natural heritage features and areas, surface water features and ground water features. The PPS, 2005 includes provisions to protect water resources using the watershed as the ecologically meaningful scale for planning. The water policies require the identification of surface and groundwater features and hydrologic functions necessary for the ecological and hydrological integrity of the watershed. These features include recharge, discharge and storage areas. Vulnerable and sensitive ground and surface water features and their functions shall be protected, improved or restored through restrictions on development and site alteration. The water policies also require protection of municipal drinking water supplies and designated vulnerable areas.

The PPS, 2005 came into effect on March 1, 2005, and decisions on all applications, matters or proceedings affecting planning matters commenced on or after March 1, 2005 shall be consistent with the PPS, 2005. Municipal official plans must also be consistent with the PPS, 2005. Municipalities are required to update their official plans at least every five years after the plan comes into effect to ensure that the official plan (OP) conforms to or does not conflict with provincial plans, has regard to matters of provincial interest, and is consistent with the PPS, 2005.

Policy 4.10 of the PPS, 2005 provides that the province, in consultation with municipalities, other public bodies and stakeholders will identify performance indicators to measure the effectiveness of some or all of its policies, and will monitor the implementation of the policies, including reviewing performance indicators concurrent with any review of the PPS. The Ministry of Municipal Affairs and Housing, in partnership with other provincial ministers, is developing performance measures to monitor the effectiveness of the PPS, 2005 and the Greenbelt Plan, (which includes the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan).

#### ***3.1.8. Places to Grow Act, 2005 and Growth Plan for the Greater Golden Horseshoe, 2006***

The Growth Plan for the Greater Golden Horseshoe has been prepared under the *Places to Grow Act*, 2005 to assist the province in implementing its vision for building stronger, prosperous communities by better managing growth in the region to 2031.

The Growth Plan is intended to build on the PPS, 2005 and the Greenbelt Plan by directing growth to existing urban areas and by promoting compact development and redevelopment, thereby reducing pressures on natural systems. The Growth Plan defers to the PPS, 2005 definition of what comprises a natural system. The Plan calls for provincial ministries, in consultation with

municipalities, identify natural systems in the Greater Golden Horseshoe and develop additional protection policies where appropriate. Planning authorities are encouraged to identify natural heritage features in relation to these natural systems. They are also encouraged to prepare watershed plans and use such plans to guide decisions concerning development and water and wastewater servicing.

### **3.2. *Local Scale Implementation***

Municipalities and conservation authorities have a key role in implementing Ontario's policy-led planning system at a local scale.

Municipalities are required to make local decisions on land use planning applications, including planning documents (e.g. official plans, zoning by-laws), and ensure that their decisions and documents are consistent with the PPS, 2005 and conform with provincial plans.

An official plan (OP) describes a municipal council's (upper, lower or single-tier) policies related to land use in a community. The municipal official plan is one of the most important vehicles for implementation of the PPS, 2005, the Growth Plan for the Greater Golden Horseshoe, and the Greenbelt Plan. The policy-led framework recognizes the diversity and uniqueness of communities across Ontario. Building upon the policy direction provided in the PPS, 2005 to protect, improve or restore the quantity and quality of water, municipal official plans identify provincial interests and set out appropriate land use designations and policies to achieve comprehensive, integrated, long-term planning. Municipalities may go beyond the minimum standards set out in the PPS, 2005 to address matters that are important in a specific community or area, provided they do not conflict with any provincial plans or the PPS, 2005.

Many municipalities work in partnership with conservation authorities to implement provincial policy direction. Conservation Authorities have delegated responsibilities for Natural Hazards from the Minister of Natural Resources under section 3.1 of the PPS, 2005. Some municipalities have entered into agreements with conservation authorities to obtain technical expertise on a range of matters such as natural hazards, natural heritage, water quality and quantity and groundwater.

Conservation authorities also have regulatory responsibilities under the *Conservation Authorities Act*. Each conservation authority is empowered by regulation to regulate development, interference with wetlands, and alterations to shorelines and watercourses. Development in or adjacent to river or stream valleys, Great Lakes and large inland lake shorelines, watercourses, hazardous

land and wetlands may require a permit or a letter of permission from a Conservation Authority.

Under the *Conservation Authorities Act*, conservation authorities have the authority to study and investigate the watershed and to develop programs to conserve, restore, develop and manage the natural resources of the watershed. In many jurisdictions, conservation authorities, municipalities and provincial ministries work together to develop watershed and subwatershed plans.

Watershed, subwatershed and tributary scale management are key to protecting, improving and/or restoring the ecological and hydrological functions of a watershed, and therefore, the key tools for implementing provincial policy direction. The watershed is the ecologically meaningful scale for planning and a relevant boundary for considering hydrologic features and functions. As part of water management, watershed studies and plans provide a broad understanding of ecosystem function and status and recommend actions for appropriate land and water management in a watershed. Watershed planning can help incorporate relevant ecosystem considerations into land use planning and decision-making to improve or restore the ecological and hydrological integrity across the watershed.

#### **4. Conclusions**

The Ministry has undertaken the Environmental Bill of Rights Review which provides an overview of the current legislation which applies to the protection of water resources on the moraine. This review also furthers the understanding of the functions of the Waterloo moraine and their interactions and as such is beneficial to other government agencies, municipalities, conservation authorities and stakeholders. The hydrogeology background report (Appendix 2) presents the state of current knowledge of the Waterloo moraine including boundaries, geology, hydrogeology, recharge and storage, water supply, maintenance of ecological features, water quantity and budget and water quality. In addition, the report provides an understanding of key science considerations such as the importance of scale in hydrogeology evaluations and discussions on ecological reserve. The report supports the use of monitoring data to guide future planning, land use policy and will assist in the development of technical guidance documents.

The review concluded that new provincial policy or legislation is not required to protect the functions of the Waterloo moraine at this time. Protection of groundwater recharge and source waters in the Waterloo moraine is required by existing provincial policies such as the *Clean Water Act, 2006*, the Provincial

Policy Statement, 2005, and augmented by more general policies for the protection of water quality and quantity such as the *Ontario Water Resources Act*.

Implementation of the *Clean Water Act, 2006* is ongoing, and it is therefore too early to comment fully on its implementation. Nevertheless, the CWA is expected to address most of the applicants' concerns about drinking water once source protection plans are prepared and implemented. The extent to which recharge areas necessary to maintain water-related ecological functions will be protected through source protection plans will be better known once these plans are finalized.

Based on the findings of the "Review of the State of Knowledge for Waterloo and Paris Galt Moraines", appended to this report, the Waterloo moraine has been studied extensively and detailed assessments of water supply are underway (results expected in 2010). The report includes a discussion of the need to analyze existing data and ensure a broad monitoring system is in place to assess future growth implications. Please refer to Appendix 2 for details.

#### Path Forward

The Ministry of Environment will undertake, in collaboration or consultation with partner ministries, First Nations and stakeholders, the development of guidance materials to assist with the implementation of policies protecting hydrologic functions (e.g. policies in the Provincial Policy Statement). The Ministry of Environment will establish a process with partner ministries, First Nations and stakeholders to determine the extent and scope of the guidance required.

## **Appendix 1: Jurisdictional Scan**

To supplement the policy analysis, a jurisdictional scan was completed. The scan focussed on policies related to protecting moraines or other similar groundwater recharge areas, including the Oak Ridges Moraine Conservation Plan.

### Oak Ridges Moraine Conservation Plan

The Oak Ridges Moraine Conservation Plan (ORMCP), released in 2002, is an ecologically based plan that provides land use and resource management direction for the 190,000 hectares of land and water within the Oak Ridges Moraine (Moraine). In addition to land use restrictions in wellhead protection areas and areas of high aquifer vulnerability, the ORMCP requires that watershed plans be completed by municipalities. The plans must include a water budget and water conservation plan as well as land and water use management strategies. Major development is prohibited unless the watershed plan has been completed and a water budget and conservation plan has demonstrated the water supply needed for the development is sustainable.

Applications for major development shall not be approved unless the applicant identifies hydrologically sensitive features (including permanent and intermittent streams, wetlands, kettle lakes, and seepage areas and springs) and related hydrologic functions and how they will be protected. Applications must also demonstrate that water supply is available without compromising the ecological integrity of the ORMCP area, and provide a water budget and conservation plan for the site and surrounding lands.

All development and site alteration with respect to land within a hydrologically sensitive feature and a minimum vegetation protection zone is prohibited, with some exceptions. Hydrological evaluations are required for development or site alteration with respect to the minimum area of influence for hydrologically sensitive features which shall demonstrate, among other things, that no adverse effects on the feature, planning and design techniques to maintain, improve and restore the health of that feature.

All development and site alteration with respect to land in a subwatershed (outside of Settlement Areas) is prohibited if the development/alteration would cause the total percentage of impervious surfaces of the subwatershed to exceed 10% or any lower percentage specified in the applicable watershed plan. Applications shall consider the importance of ensuring natural vegetation is maintained, and where possible, improved or restored and that impervious surfaces, and their impacts to water quality and quantity are minimized.

The province has developed a set of technical papers to assist in the

implementation of the ORMCP. These papers provide guidance on the preparation of watershed plans and water budgets, on imperviousness at a subwatershed scale, and on maintaining connectivity between natural heritage and hydrologic features, as well as other matters.

The majority of municipal ORMCP official plan and zoning by-law conformity amendments are now in place. The effectiveness of the ORMCP is monitored in part through the Monitoring the Moraine (MTM) initiative. The MTM is a collaborative community-based project coordinated by Save the Oak Ridges Moraine (STORM), Citizen's Environment Watch (CEW), and the Centre for Community Mapping (COMAP). The MTM initiative engages volunteers in measuring changes to the landscape of the moraine as a result of the ORMCP. It also aims to ensure that reporting of the information gathered through the process is communicated to other stakeholders.

The MMAH sits on the MTM advisory committee to provide advice on the project, exchange information and ensure there is coordination between local and provincial monitoring initiatives. Under the Greenbelt Plan, 2005, MMAH is committed to developing a performance monitoring framework for the entire Greenbelt Plan area, including the Oak Ridges Moraine.

#### Other Jurisdictions

An examination of jurisdictions found moraines in Alberta, Minnesota, Wisconsin, Michigan and Ireland. A summary of policies related to moraine protection follows.

The Cooking Lake moraine is located in central **Alberta** and encompasses all of Elk Island National Park. The Strathcona Country's 'Municipal Development Bylaw' calls for the identification, conservation, and protection of environmentally sensitive land, the protection of watersheds to maintain water quality and quantity of surface and groundwater systems, and for the protection of lands, through instruments and policies, where sensitive groundwater resources have been identified. Moreover, the local development plan recently re-designated the moraine area to a special policy area to further restrict subdivision capabilities. There are no specific policies for the protection of moraines in Alberta.

**Minnesota** has three moraines – the Pines, the St. Louis, and the Coteau moraines. Minnesota statutes contain direction for the long term coordination of water planning activities between local, regional and federal bodies. State authorities are to ensure that groundwater water quality monitoring and related data is provided and integrated into the state's land management information system. There are no specific policies for the protection of moraines in the state.

**Wisconsin's** "Kettle Moraine" is protected by the state's groundwater protection statute. The *Groundwater Protection Act* enables a protection program which

includes a set of standards based on a list of substances; regulatory programs to which state water authorities must comply (e.g. water, wastewater, site remediation, fuel storage); aquifer characterisation requirements (e.g. potential use, vulnerability); local groundwater management (e.g. authority for zoning, ordinances, well replacement and maintenance); and monitoring, research, and coordination. In 2008, Wisconsin's Groundwater Coordinating Council was required, by statute, to submit an annual report describing the current groundwater quality of the state, assessing groundwater management programs, and providing information on implementation. There are no specific policies for the protection of moraines in Wisconsin.

Glacial landforms dominate the surface of most of the state of **Michigan**. The state has several programs in place for the protection of drinking water. The Source Water Assessment Program, which is enabled by the *Safe Drinking Water Act*, identifies areas that supply public water, inventories contaminants and assesses water system susceptibility to contamination, and informs the public of the results. A water wellhead protection program is also in place to assist local communities utilizing groundwater for their municipal drinking water supply systems in protecting their water sources. A well construction and decommissioning program is also implemented. Finally, Michigan has a groundwater discharge program to regulate discharges to groundwater. There are no specific policies for the protection of moraines in the state.

Ground and Rogen moraines are common in **Ireland**. Groundwater protection policies have taken into consideration current European policy for the protection of groundwater. Components of the policy include: zoning land according to classification of groundwater vulnerability to pollution; source protection by means of groundwater protection zones; specific policy statements on the control of groundwater quantity and quality, including groundwater abstraction, as well as waste disposal, contaminated land and other potentially polluting sources; and monitoring, databasing and analysis. There are no specific policies for the protection of moraines in Ireland.

Based on this review related to moraines in other the jurisdictions, it seems that there are a number of policies for the protection of groundwater and surface water resources, however, with the exception of the Oak Ridges Moraine Conservation Plan, there are no other policy statements intended specifically for moraine protection.



## **Appendix 2: Review of the State of Knowledge for Waterloo and Paris Galt Moraines**

Report prepared by Blackport Hydrogeology Inc., Blackport and Associates Ltd.,  
AquaResource Inc.